

CLAIMS

1. A plastic cassette suitable for DNA analysis comprising a top plate and an opposing bottom plate affixed thereto, the plates in combination forming therebetween an isolation chamber suitable for isolating DNA from the biological sample suspected of containing the target DNA, one or more reaction chambers in fluid communication with the isolation chamber and suitable for amplifying any target DNA found in the isolation chamber, a digestion chamber which is the same as or in fluid communication with the amplification chamber and suitable for digesting the amplified target DNA ("amplicons") with restriction endonucleases to produce digestion fragments that are characteristic for the target DNA, and a separation chamber in fluid communication with the digestion chamber for receiving and separating the digested and un-digested amplicons, one of the plates having a port for receiving a biological sample suspected of containing a target DNA, the port being in fluid communication with the isolation chamber.
2. The cassette of claim 1, further comprising a waste chamber for receiving undesired sample, or components or reagents.
3. The cassette of claim 2, wherein the waste chamber is in fluid communication with the isolation chamber by a first channel.
4. The cassette of claim 3, wherein the first channel has a first valve operatively positioned therein.
5. The cassette of claim 1, wherein the isolation chamber is associated with a piston suitable for drawing fluid into the chamber.
6. The cassette of claim 1, wherein the isolation chamber is in fluid communication with the one or more reaction chambers by a second channel.
7. The cassette of claim 1, wherein the second channel has a second valve operatively positioned therein.
8. The cassette of claim 1, wherein the reaction chamber suitable for amplifying any target DNA and the digestion chamber suitable for digesting the target DNA are the same chamber.

9. The cassette of claim 1, wherein the reaction chamber is in fluid communication with the separation chamber by a third channel.

10. The cassette of claim 9, wherein the third channel has a third valve operatively positioned therein.

11. The cassette of claim 1, wherein the separation chamber has a separation medium therein.

12. The cassette of claim 11, wherein the separation medium is an electrophoretic medium.

13. The cassette of claim 12, wherein the electrophoretic medium is a slab of gel or in a capillary.

14. The cassette of claim 13, wherein a portion of the separation chamber is sufficiently transparent for detecting separated restriction fragments therein.

15. The cassette of claim 14, wherein the sufficiently transparent portion of the separation chamber is sufficiently transparent to visible light.

16. The cassette of claim 14, wherein the sufficiently transparent portion of the separation chamber is sufficiently transparent to ultra-violet light.

17. The cassette of claim 16, wherein the separation chamber is about 90% transmissible to UV light.

18. The cassette of claim 16, wherein the separation chamber is about 95% transmissible to UV light.

19. The cassette of claim 16, wherein the separation chamber is about 97% transmissible to UV light.

20. The cassette of claim 19, wherein the plastic is an acrylic.

21. The cassette of claim 20, wherein the acrylic is a polymethylmethacrylate.

22. The cassette of claim 1, wherein the top plate and the opposing bottom plate are injection molded.

23. The cassette of claim 4, wherein the valve comprises an elastomeric rubber.

24. The cassette of claim 23, wherein the valve comprises a layer of elastomeric rubber positioned between the top plate and the opposing bottom plate.

25. The cassette of claim 24, wherein the valve is closed by external compression thereon.

26. The cassette of claim 24, further comprising an elastomeric layer positioned along the edge of the chambers and channels to provide a watertight seal between the upper plate and the lower plate.

27. The cassette of claim 26, wherein the elastomeric layer is a compression seal.

28. The cassette of claim 27, wherein the upper plate is affixed to the lower plate by an adhesive or by ultrasonic welding.

29. The cassette of claim 28, wherein the upper plate is affixed to the lower plate by an adhesive.

30. The cassette of claim 4, wherein the first valve is a compression valve.

31. The cassette of claim 7, wherein the second valve is a compression valve.

32. The cassette of claim 10, wherein the third valve is a compression valve.

33. The cassette of claim 6, wherein the isolation chamber is connected to 1 to 24 parallel reaction chambers.

34. The cassette of claim 33, wherein the 1 to 24 parallel reaction chambers also function as 1 to 24 parallel digestion chambers, respectively.

35. The cassette of claim 34, wherein the 1 to 24 parallel digestion chambers are respectively connected by a 1 to 24 parallel channels to 1 to 24 parallel separation chambers, respectively.

36. The cassette of claim 34, wherein separate channels fluidly connect each of the 1 to 24 parallel digestion chambers to 1 to 24 application points, respectively, on an electrophoretic gel positioned in the separation chamber.

37. The cassette of claim 36, wherein the gel is a slab gel positioned in the separation chamber between the top plate and the opposing bottom plate affixed thereto.

38. The cassette of claim 37, wherein the slab gel is a polyacrylamide gel.

39. The cassette of claim 1, further comprising a mixing chamber in fluid contact with the separation chamber.

40. The cassette of claim 39, wherein both the isolation chamber and the mixing chamber has a piston or plunger moveably sealed therein for drawing fluid therein and or pushing fluid thereout or both.

41. A plastic cassette suitable for DNA analysis comprising a top plate and an opposing bottom plate affixed thereto, the plates in combination forming therebetween a first chamber suitable for receiving a biological sample suspected of containing a target DNA or protein, one or more reaction chambers in fluid communication with the first chamber and suitable for amplifying any target DNA found in the isolation chamber, said reaction chambers including a digestion chamber which is the same as or in fluid communication with the amplification chamber and suitable for digesting the amplified target DNA (“amplicons”) with restriction endonucleases to produce digestion fragments that are characteristic for the target DNA, the fluid communication to each of said one or more reaction chambers being controlled by a respective valve, each of said reaction chambers having a port for providing access to contents therein.